

The first teratological case for the Australian *Omorgus* Erichson, 1847 species (Coleoptera, Scarabaeoidea, Trogidae)

Vinícius da Costa-Silva¹

¹ *Invertebrate Biodiversity and Conservation Group, Department of Zoology and Entomology, University of Pretoria, Private Bag X20, Hatfield, 0028, South Africa*

<https://zoobank.org/0DEA4D08-8B4A-4F66-81C0-85F539A48B20>

Corresponding author: Vinícius da Costa-Silva (silvavinicius92@gmail.com)

Academic editor: Vinicius S. Ferreira | Received 4 February 2025 | Accepted 22 April 2025 | Published 28 May 2025

Abstract

A new case of hemidystrophy in Trogidae is here described and illustrated. The teratological specimen was identified as a male of *Omorgus* (*Omorgus*) *alternans* (MacLeay, 1827), being the first record of a teratological specimen of a trogid from Australia. While teratological cases provide limited taxonomic insights, they offer significant understanding of the environmental influences on insect development. The study emphasizes the importance of documenting such anomalies, contributing to the broader knowledge of developmental biology in insects, particularly within the under-researched Australian Trogidae.

Key Words

Anomalies, Australia, hemidystrophy, morphology, Omorginae, teratology

Introduction

According to Balazuc (1948), the modern concept of teratology can be defined as the study of specimens that present one or more exceptional anatomical abnormalities or malformations (also see Ujházy et al. (2012) for a historical overview of the concept). These malformations can be caused by several endogenous or exogenous factors, such as disruptions during embryonic or postembryonic development, physical or chemical components, or even parasitism (Balazuc 1948, 1969; Clark and Belo-Neto 2010; Ujházy et al. 2012).

Teratological cases were reported in different groups of insects (Balazuc 1948, 1951, 1955, 1958; Goretti et al. 2020; Taszakowski and Kaszyca-Taszakowska 2020).

For Coleoptera—the most diverse group in Insecta—several cases were published with Tenebrionidae (Ferrer et al. 2014), Cerambycidae (Castro-Tovar et al. 2014), Staphylinidae (Asiain and Marquez 2009), Histeridae (Degallier and Gomy 2007), Oedemeridae (Castro-Tovar et al. 2014), Carabidae (Ghannem et al. 2015), and Cleridae (Burke et al. 2018). For the superfamily Scarabaeoidea, cases have been reported for families such as Scarabaeidae (Clavijo-Bustos et al. 2022; Deschodt et al. 2023), Cetoniidae (Gasca-Álvarez et al. 2017), Melolonthidae (Guzmán-Vásquez et al. 2020), Geotrupidae (Bunalski and Lubecki 1990), Lucanidae (Balazuc 1948), and Trogidae (Romero-Samper 1993; Verdugo 2013). For a list of teratologies in Scarabaeoidea, see Gasca-Álvarez et al. 2017).

Trogidae MacLeay, 1819 is a widespread family of Scarabaeoidea with five extant genera and c. 350 valid names (Strümpher et al. 2016; Costa-Silva et al. 2024). To date, just two cases of abnormalities are known for European species of trogids: a symphysocery in *Trox* (*Granulitrox*) *cotodognanensis* Compte, 1985, described by Verdugo (2013), and a bilateral cystelytry in *Trox* (*Granulitrox*) *hispanicus* Harold, 1872, by Romero-Samper (1993). Although teratological specimens do not provide relevant taxonomic information, the description and reporting of these morphological anomalies is of utmost importance, as they can offer crucial information about the influences of environmental conditions during the development stages of insects (Savini and Furth 2004). Thus, the main goal of the present study is to report a teratological case in the Australian species of Trogidae. This is the first teratological case in trogids from the Australian region.

Materials and methods

During a visit to the Canadian Museum of Nature (CMNC) to study Trogidae specimens, I had the opportunity to examine a teratological specimen of Trogidae. The taxonomic revision of the Australian Trogidae (Scholtz 1986) was used to identify the specimen as a male of *Omorgus* (*Omorgus*) *alternans* (MacLeay, 1827). The aedeagus was also examined in order to confirm the identification.

Photographs of the specimen's habitus were taken using a Leica Z16 APOA apochromatic zoom system with a DMC 5400 camera. The plate was generated using Adobe Photoshop CS6. The nomenclature used here follows Balazuc (1948) for anatomical abnormalities and Costa-Silva et al. (2024) for external morphology of Trogidae.

Data from the specimen labels were transcribed verbatim in quotation marks (""). A forward slash (/) was used to indicate a new line on the same label. Any additional or explanatory information was given in square brackets ([]). All handwritten information is bold and italics.

Results and discussion

Material examined

First label [white, typeset]: "AUSTRALIA: WA / Wilga / 22–23.VIII.1981 / H and A Howden". Second label [white, unknown's handwriting]: "***Trox M'Leay* / *alternans*** / det. C.H. Scholtz **1983**". Third label [white, printed]: "[QR Code] / WORLD / TROGIDAE / DATA-BASE / WTD0000104" (Fig. 1D) (1♂ CMNC).

Description of the teratological features in the specimen of *Omorgus* (*Omorgus*) *alternans* (Figure 1A–C)

The malformation is present on the pronotum and at the base of the right elytron. Head: left margin of head slightly reduced, exposing dorsally the surface of the left eye and base of left mandible. Pronotum: hemidystrophy on the left side, resulting in the lateral margin shorter than usual. Pronotal ridges visible basally; indistinct in rest. Deformation present on the latero-basal part of pronotum, allowing partial visualization of the scutellum (Fig. 1C). Basal, latero-basal, and antero-lateral tubercles indistinct on the right side. Elytra: basal edge also with a presence of hemidystrophy; elytral costae 4–8 indistinct. Humeral callus more prominent than usual. Deformation close to but not affecting the scutellum. Lateral margins without deformations. Antennae, eyes, mouthparts, abdomen, legs, and aedeagus normal.

Cases of teratological insects are common, although relatively few have been formally described and illustrated in the literature (Gasca-Álvarez et al. 2017) compared to the overall biodiversity of the group. In the superfamily Scarabaeoidea, approximately 60 species with teratological individuals have been reported to date (Gasca-Álvarez et al. 2017; Clavijo-Bustos et al. 2022; Deschodt et al. 2023). This number represents only 0.14% of the 41,818 described species of Scarabaeoidea (Schoolmeesters 2025).

The present report comprises a third case of teratology in the family Trogidae and the first known instance of hemidystrophy. The first case was reported by Romero-Samper (1993), who described bilateral cystelytry in a female specimen of *Trox* (*Granulitrox*) *hispanicus*. According to the author, this malformation had a genetic origin, although no solid evidence or arguments were provided to support this claim. The second case, reported by Verdugo (2013), involved *Trox* (*Granulitrox*) *cotodognanensis*, in which the author documented the fusion of some antennomeres (symphysocery).

The cause of the anatomical abnormalities observed in the current specimen examined could not be determined. It is likely that many species with teratological individuals remain undocumented in entomological collections and museums (see case in Deschodt et al. 2023). As these collections are accessible or available to researchers, it is of importance to document such anomalies to help address the gaps in our understanding of teratological specimens and their correlation with environmental conditions.

This report aims to stimulate further research in this field, fostering curiosity and encouraging the pursuit of answers, particularly within the family Trogidae.

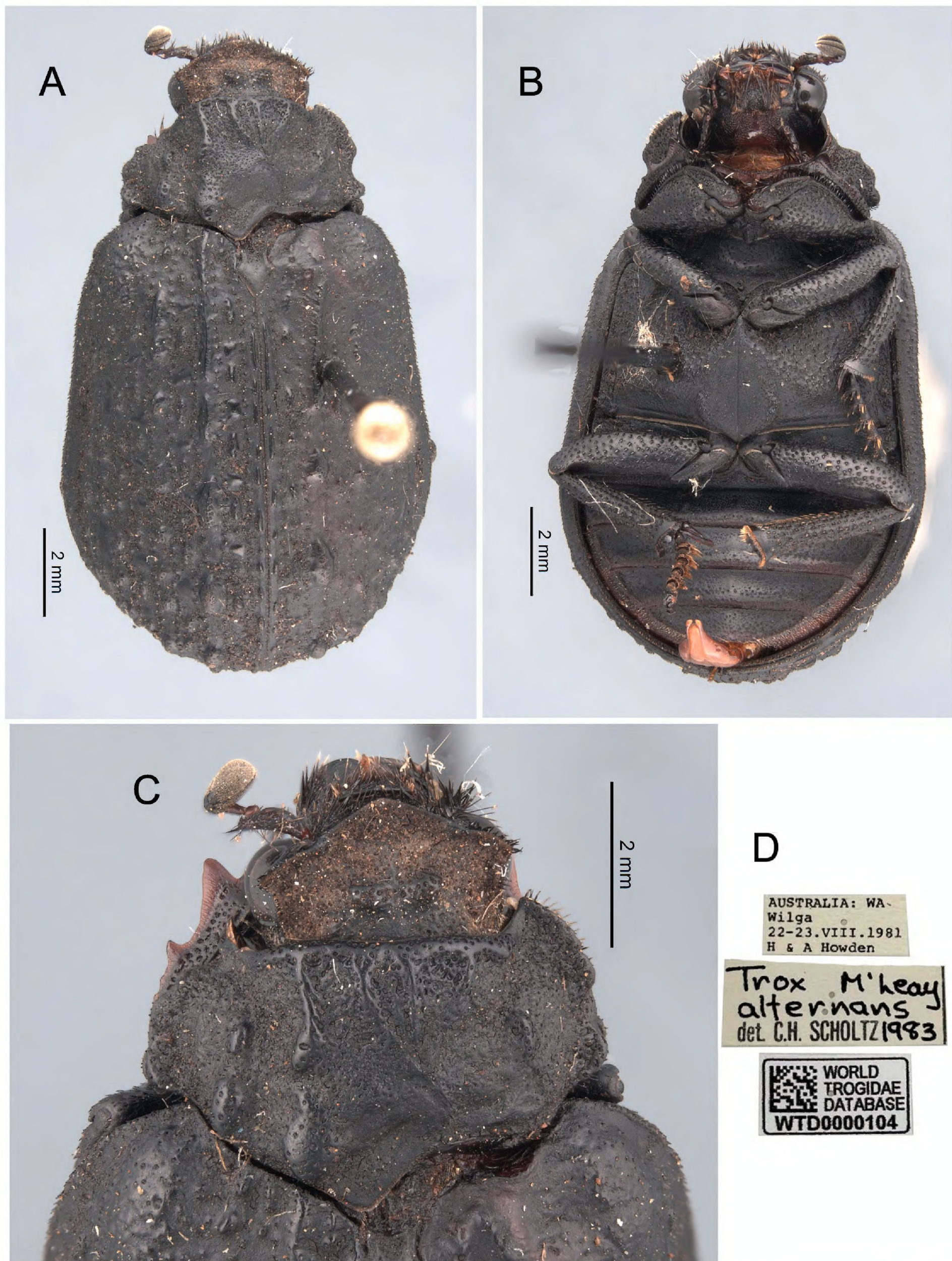


Figure 1. Teratological specimen of *Omorgus* (*Omorgus*) *alternans* (MacLeay, 1827) in: **A.** Dorsal and **B.** Ventral view; **C.** Details of head, pronotum, and base of elytra showing the hemidystrophy; **D.** Labels. Photos: Andrew Smith (CMNC).

Acknowledgments

I am grateful to the Stewart and Jarmila Peck Visiting Scientist Awards in Entomology for the financial support to visit the Canadian Museum of Nature (CMNC—Ottawa, Canada) and to Andrew Smith and François Génier (CMNC) for all support during my visit to the institution. I also thank Gimo Daniel (NASMUS) for his comments and suggestions. A special thanks to the Post-Doctoral Fellowship Programme from the University of Pretoria and Prof. Catherine Sole (University of Pretoria, South Africa) for the provision of all laboratory facilities.

References

- Asiain J, Márquez J (2009) New teratological examples in Neotropical Staphylinidae (Insecta, Coleoptera), with a compilation of previous teratological records. *Revista Mexicana de Biodiversidad* 80: 129–139. <https://doi.org/10.22201/ib.20078706e.2009.001.590>
- Balazuc J (1948) La Tératologie des Coléoptères et expériences de transplantation sur *Tenebrio molitor* L. *Mémoires du Museum d'Histoire Naturelle de Paris* (N. S.) 25: 1–293.
- Balazuc J (1951) La Tératologie des Hémiptères et groupes voisins. *Annales de la Société Entomologique de France* 120: 17–66. <https://doi.org/10.1080/21686351.1951.12279052>
- Balazuc J (1955) La Tératologie des Orthoptéroïdes. A propos de quelques nouveaux faits observationnels et expérimentaux. *Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestre" di Portici* 14: 48–64.
- Balazuc J (1958) La Tératologie des Hyménoptéroïdes. *Annales de la Société Entomologique de France* 127: 167–203. <https://doi.org/10.1080/21686351.1958.12279115>
- Balazuc J (1969) Supplément à la Tératologie des Coléoptères. *Redia* 51: 39–111.
- Bunalski M, Lubecki K (1990) Interesting case of symmetric teratology in *Geotrupes (Trypocopris) vernalis* (L.) (Coleoptera, Scarabaeidae). *Bulletin Entomologique de Pologne* 59: 821–825.
- Burke AF, Sole CL, Scholtz CH (2018) A remarkable teratological case for *Eucymatodera parva* Schenkling, 1908 (Cleridae, Tillinae) from Namibia. *African Entomology* 26(1): 250–253. <https://doi.org/10.4001/003.026.0250>
- Castro-Tovar A, Baena M, López-Vergara MA (2014) Nuevos casos de teratologías en Coleoptera (Insecta). *Zoologica baetica* 25: 3–12.
- Clark SM, Belo-Neto LA (2010) A remarkable teratological specimen of *Pseudoluperus longulus* (Le Conte) (Coleoptera, Chrysomelidae) from Utah, U.S.A. *The Coleopterists Bulletin* 64(4): 383–385. <https://doi.org/10.1649/0010-065X-64.4.383>
- Clavijo-Bustos J, Torres MA, Neita-Moreno JC (2022) Unusual teratological cases in Scarabaeidae (Coleoptera, Scarabaeoidea): two specimens with multiple malformations. *Revista Chilena de Entomología* 48(2): 361–367. <https://doi.org/10.35249/rche.48.2.22.18>
- Costa-Silva V, Strümpher WP, Thyssen PJ, Vaz-de-Mello FZ (2024) Taxonomic revision of the South American genus *Polynoncus* Burmeister, 1876 (Coleoptera, Scarabaeoidea, Trogidae). *Journal of Natural History* 58(1–4): 14–166. <https://doi.org/10.1080/00222933.2023.2260060>
- Degallier N, Gomy Y (2007) Malformations et cas tératologiques chez les Coléoptères Histeridae. *Le Coléoptériste* 10(1): 15–18.
- Deschodt CM, Vaughan J, Sole CL (2023) Teratology in a Century-Old Museum Specimen of *Kheper cupreus* (Laporte de Castelnau, 1840) (Coleoptera, Scarabaeidae, Scarabaeinae) from Zimbabwe. *The Coleopterists Bulletin* 77(1): 80–82. <https://doi.org/10.1649/0010-065X-77.1.80>
- Ferrer J, Fernández-López J, Fernández-González A, Fernández-Menéndez D (2014) Unusual teratology for a tenebrionid: antennal schistomelia in *Probatiscus granulatus* (Allard, 1876) (Coleoptera, Tenebrionidae). *The Coleopterists Bulletin* 68(1): 139–142. <https://doi.org/10.1649/0010-065X-68.1.139>
- Gasca-Álvarez HJ, Deloya C, Reyes-Castillo P (2017) Teratological cases in five species of *Cotinis* Burmeister (Coleoptera, Scarabaeidae, Cetoniinae, Gymnetini), with a compilation of teratologies in Scarabaeoidea. *The Coleopterists Bulletin* 71(2): 329–338. <https://doi.org/10.1649/0010-065X-71.2.329>
- Ghannem S, Zrelli S, Boumaiza M (2015) New teratological record in Carabidae (Insecta, Coleoptera) from Tunisia. *Arquivos Entomológicos* 14: 127–129.
- Goretti E, Pallottini M, Pagliarini S, Catasti M, La Porta G, Selvaggi R, Gaino E, Di Giulio AM, Ali A (2020) Use of larval morphological deformities in *Chironomus plumosus* (Chironomidae, Diptera) as an indicator of freshwater environmental contamination (Lake Trasi-meno, Itali). *Water* 12(1): 1–17. <https://doi.org/10.3390/w12010001>
- Guzmán-Vásquez HM, Hernández-Cruz J, Gasca-Álvarez HJ (2020) Description of teratologies in two species of the genus *Phyllophaga* (Coleoptera, Scarabaeidae, Melolonthinae). *Revista Colombiana de Entomología* 46(1): e8538. <https://doi.org/10.25100/socolen.v46i1.8538>
- Romero-Samper J (1993) Descripción de dos casos teratológicos en Coleoptera Scarabaeoidea. *Boletín Asociación Española de Entomología* 17: 345.
- Savini V, Furth D (2004) Teratología en Coleoptera: un caso en *Gioia bicolor* (Blake 1969) (Chrysomelidae, Alticinae) de Jamaica. *Entomotropica* 19: 165–167.
- Schoolmeesters P (2025) World Scarabaeidae Database (version 2024-12-04). In: Bánki O, Roskov Y, Döring M, Ower G, Hernández Robles DR, Plata Corredor CA, Stjernegaard Jeppesen T, Örn A, Pape T, Hobern D, Garnett S, Little H, DeWalt RE, Ma K, Miller J, Orrell T, Aalbu R, Abbott J, Aedo C, et al. *Catalogue of Life* (Version 2024-12-19). Catalogue of Life, Amsterdam, Netherlands. <https://doi.org/10.48580/dglq4-38g>
- Strümpher WP, Villet MH, Sole CL, Scholtz CH (2016) Overview and revision of the extant genera and subgenera of Trogidae (Coleoptera, Scarabaeoidea). *Insect Systematics and Evolution* 47(1): 53–82. <https://doi.org/10.1163/1876312X-46052133>
- Taszakowski A, Kaszyca-Taszakowska N (2020) Teratological cases of the antennae in the family Aradidae (Hemiptera, Heteroptera). *Scientific Reports* 10: e1027. <https://doi.org/10.1038/s41598-020-57891-1>
- Ujházy E, Mach M, Navarova J, Brucknerova I, Dubovicky M (2012) Teratology – past, present and future. *Interdisciplinary Toxicology* 5: 163–168. <https://doi.org/10.2478/v10102-012-0027-0>
- Verdugo A (2013) Acerca de un caso de sinfisoceria asociada a una posible criptomeiomelia de la antena izquierda en *Trox cotodognanensis* Compte, 1985 (Coleoptera, Trogidae). *Revista Gaditana de Entomología* 4: 49–53.